Reliability of Integrated Passive Devices with Silver Metallization

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Increased reliability of multi-chip assemblies can be achieved through integration of passive devices (capacitors, inductors, resistors) into the package itself. For high frequency modules, silver conductors provide the lowest loss interconnects. However, concerns about silver migration have kept its use form being widespread.

In this study, breakdown of integrated capacitors constructed of a recrystallizing low temperature cofired ceramic with pure silver electrodes was examined. Devices were subjected to accelerated stress through increased temperatures (up to 200°C) and voltages (up to 3,000 volts).

The failure mode was time-dependent dielectric breakdown rather that the expected silver migration path. Predicted lifetimes and failure mechanisms will be discussed. Test , methodologies and their relation to overall reliability and assurance of the structures will also be discussed.